IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	**MAIL STOP APPEAL BRIEF - PATENTS**
Tomi Veikonheimo et al.	Group Art Unit: 3617
Application No.: 10/539,089	Examiner: Daniel V. Venne
Filed: December 14, 2005	Appeal No.: _____
For: ARRANGEMENT IN A PROPULSION SYSTEM	

APPEAL BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal is from the decision of the Primary Examiner dated June 15, 2009 finally rejecting claims 1-10 and 12-16, which are reproduced as the Claims Appendix of this brief.

☒ Charge ☐ $ 270 ☒ $ 540 to Credit Card

The Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

Table of Contents

I. Real Party in Interest

The present application is assigned to ABB Oy. ABB Oy is the real party in interest, and is the assignee of Application No. 10/539,089.

II. Related Appeals and Interferences

The Appellant legal representative, or assignee, does not know of any other appeal or interferences which will affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 1-10 and 12-16 are pending stand rejected, and are appealed. Claim 11 has been canceled.

IV. Status of Amendments

No claim amendments have been filed subsequent to the Rejection of January 29, 2009. A Request for Reconsideration was filed on September 15, 2009. In an Advisory Action dated September 23, 2009 it was indicated that the Request for Reconsideration has been considered but does not place the application condition for allowance (item no. 11).

V. Summary Claimed Subject Matter

Pursuant to 37 C.F.R. §41.37(1)(c)(v), the subject matter of each independent claim on appeal (claims 1 and 12) is cross-referenced to the specification in the following tables:

Claim 1	**Cross-Reference to the Disclosure**
Arrangement in a counter rotating propulsion system comprising	Page 1, lines 2 and 21-22.
an aft propeller installed on a thruster rotatable about a vertical axis, and	Page 1, line 25; Page 4, line 5; Figure 1, element 22.

a forward propeller installed on a shaft or on a thruster,	Page 3, lines 22-23; Page 4, line 8-10; Figure 1; element 6.
whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other,	Page 4, lines 8-11; Figure 1, elements 6 and 22.
each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other,	Page 4, lines 8-9; Figures 1, 2a and 2b, elements 10, 26, 30.
the cap on the forward propeller having a length wherein at least two equally distributed flow plates are arranged on the cap of the forward propeller	Page 2, lines 1-5; Page 4, lines 18-20; Figures 1, 2a and 2b, element 28.
and that the flow plates are radially projecting from the cap, the flow plates on the whole length of the forward cap and link up to each other and extend beyond an aft facing end of the cap.	Page 4, lines 27-30; Figures 1, 2a and 2b, element 28.
Claim 12	**Cross-Reference to the Disclosure**
An arrangement comprising: a thruster rotatable about a vertical axis comprising an aft propeller, a first hub and a first cap; and	Page 4, lines 1-9; Figure 1, elements18, 22 and 26.
a forward propeller, and a second hub and a second cap associated with the forward propeller,	Page 4, line 8; Figures 1, 2a and 2b, elements 10 and 30.
the second cap having a diameter, the second cap having a length	Page 2, lines 1-5; Page 4, lines 18-20 and 25-32; Page 5, line 1; Figures 1, 2a

comprising a plurality of equally spaced flow plates projecting from the second cap in a radial direction with no inclination and without extending beyond the diameter of the second cap;	and 2b, element 28.
wherein the aft propeller and the forward propeller have opposite directions of rotation;	Page 4, lines 10-11.
wherein the first cap and the second cap are arranged opposing each other and are spaced apart; thereby defining a separation zone; and	Page 2, lines 7-9; Figure 1
wherein the flow plates are constructed and arranged to eliminate cavitation in the separation zone when the aft propeller is not co-axial with the forward propeller,	Page 1, lines 24-29; Page 4 lines 11-20.
the flow plates on the whole length of the second cap and link up to each other and extend beyond an aft facing end of the cap.	Page 4, lines 27-30; Figures 1, 2a and 2b, element 28.

The portions of the specification have been identified above in order to comply with the requirements of 37 C.F.R. §41.37(c)(1)(v). The above references to the specification should not be construed as limiting the scope of the claimed subject matter to the various embodiments described in the specification, or otherwise as a vehicle for importing limitations into the claims from the specification. No representation is made that the above-identified portions of the disclosure are the only basis for support for the claimed subject matter.

VI. Grounds of Rejection to be Reviewed on Appeal

Whether claims 1-10 and 12-16 are unpatentable as being obvious over WO 01/54971 to Varis (hereafter "Varis") in view of GB 9795 and NO 10907 to Parsons (hereafter collectively "Parsons") and CA 245576 to Akimoff (hereafter "Akimoff")

VII. Argument

A. Background

The present invention is directed to an improved propulsion arrangement. In particular, the present invention is directed to an arrangement in a counterrotating propulsion (CRP) system. The unique nature of CRP systems presents specific engineering and design challenges. One unique problem associated with a CRP system is an additional cavitation affect produced when the aft propulsion is pivoted, such as when a thruster is turned to steer a vessel, the aft propeller operates in the wake of the forward propeller while the aft propeller is turned at an angle relative to the forward propeller (see, e.g., page 1, lines 15-19 of the present specification). This form of cavitation is sometimes referred to as "sheet cavitation." An arrangement constructed according to the present invention minimizes the harmful effects associated with hub vortex cavitation by arrangement a hub after the forward propeller with flow plates being disposed on the hub. Thus, the present invention provides a CRP system with improved performance and reliability.

B. Legal Principles

The Examiner bears the initial burden of factually supporting any *prima facie* assertions of obviousness. See, e.g., *MPEP §2142*. When engaged in this process, the Examiner must avoid using impermissible hindsight to reach the legal conclusion, and instead the conclusion must be reached on the basis of the facts established from the prior art. *Id.* If the Examiner determines that there is factual support for a rejection of the claimed invention under 35 U.S.C. §103, the Examiner must then consider any evidence submitted by the applicant which contradicts this conclusion. *Id.* Thus, when an applicant submits evidence, the Examiner must then reconsider the patentability of the claimed invention based upon consideration of all of the

evidence including the evidence submitted by the applicant. A decision to make or maintain a rejection in the face of all of the evidence must show that it was based on the totality of the evidence. Facts that are established by evidence submitted by the applicant must be evaluated along with the facts upon which the conclusion of obviousness was reached. *In re Eli Lily & Co.*, 902 F.2d 943, 14 USPQ2d 1741 (Fed. Cir. 1990).

When considering the question of obviousness, a prior art reference must be considered in its entirety, including portions that would lead away from the claimed invention. It is reversible error to selectively pick and choose portions of a prior art reference when attempting to establish a *prima facie* case of obviousness, while ignoring those which contradict that conclusion. *W.L. Gore & Associates, Inc. v. Gar-Lock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984); MPEP §2141.02.

Similarly, the invention must likewise be considered as a whole. Thus, the analysis of obviousness under 35 U.S.C. §103 should not focus on whether the differences between the claimed invention and the prior art themselves would have been obvious, but rather whether the claimed invention as a whole would have been obvious. Therefore, the source of the problem which the invention is intended to address, as well as its solution, are considered to be part of the invention as a whole. *Ex parte Hiyamizu*, 10 USPQ2d 1393, 1394-95 (B.P.A.I. 1988).

A *prima facie* conclusion of obviousness is inappropriate where one of ordinary skill in the art would not have a reasonable expectation of success based on the combination of teachings contained in the prior art. See, e.g., *MPEP §2143.02.*

C. Rejection of claims 1-10 and 12-16 as being obvious over Varis in view Parsons and Akimoff

1. Rejection of claim 1

Varis, which is commonly owned with the present application and referenced in the background section of this case, is directed to a counter rotating propeller-type propulsion system. However, as admitted in a grounds for rejection, *Varis* fails to

disclose, or even suggest, a propeller hub having a cap with at least two (a plurality) equally distributed flow plates arranged thereon.

Parsons is directed to a single propeller-type propulsion system. It is alleged that *Parsons* discloses a cone with flow plates disposed thereon to help reduce "cavitation effects." However, as admitted in a grounds for rejection, *Parsons* fails to disclose flow plates that either extend the entire length of the cap or extend beyond the aft end thereof, as required by claim 1.

In addition, it is important to recognize that, in contrast to the unique problems associated with the operation of CRP propulsion systems, *Parsons* is directed to a single propeller arrangement. The unique problems associated with CRP systems are not present during operation of the single propeller system described by *Parsons*. Thus, for example, the disclosure of *Parsons* is of minimal relevance to one of ordinary skill in the art seeking to minimize the effects of the aforementioned "sheet cavitation" as well as the interaction between said sheet cavitation and other forms of cavitation which may be present in the operation of CRP systems. Thus, one of ordinary skill in the art seeking to modify the CRP system of *Varis*, such as in an attempt to minimize adverse consequences of complex cavitation effects experienced during operation of these systems, would not have viewed the teachings of *Parsons* as being particularly relevant to providing modifications which would be successful in eliminating or mitigating the aforementioned complex and interacting cavitation mechanisms that are not present in single propeller propulsion systems. It would not have been obvious to one of ordinary skill in the art to have modified CRP system of *Varis* based on the teachings of a very rudimentary single propeller system as described in *Parsons*. The grounds for rejection improperly focus solely on the differences between the claimed invention and the prior art, and fail to consider the invention as a whole.

Moreover, since *Parsons* involves a single propeller, and not a forward and aft propeller system, there is no guidance provided whatsoever with regard to the teachings of *Parsons* as to whether one should modify the forward or aft propeller arrangement of a CRP system such as that described by *Varis*, much less how to go about modifying them.

It is asserted on page 4 of the Official Action that *Akimoff* discloses flow plates that extend along substantially the entire length of the cap and link up to each other and extend beyond an aft-facing end of a propeller hub cap.

Akimoff, like *Parsons*, is directed to a single propeller arrangement opposing a rudder. *Akimoff* also provides no guidance with respect to whether one should modify a forward or aft propeller of a CRP system such as that described by *Varis*, or how the complex cavitation mechanisms of a CRP system could be adequately addressed.

In the Declaration Pursuant to 37 C.F.R. §1.132 filed December 8, 2008, evidence was proffered with respect to why one of ordinary skill in the art would have been led away from the proposed modification, involving increasing the surface area of the fins of *Parsons*, for the reason that increasing the surface area of the fins results in increased friction as the propeller rotates through the water. This increased friction increases the load on the propeller, thereby slowing the rotation thereof absent the application of additional power to rotate the propeller. Therefore, increasing the surface area of the fins possesses at least the disadvantage of decreased efficiency of the power train of the vessel. Therefore, applicants respectfully submit that it would not necessarily have been obvious, and even counter-intuitive, to one of ordinary skill in the art to undertake the proposed modification of the fins of *Parsons* in view of *Akimoff.*

It is noted that on page 5 of the Office Action of January 29, 2009, it was asserted that the Declaration filed December 8, 2008 is insufficient to overcome the rejection of the previously presented claims 1-14 "because the prior art references cited in combination are considered to disclose the claimed features of Applicants' invention." However, such commentary does not address the evidence presented. Declaration evidence and arguments have been presented providing reasons why the proposed combination would not have rendered the claimed invention obvious. In the Final Rejection, the only mention of the Declaration evidence of record appears on page 6, paragraph 9 where it is stated ". . . the Examiner disagrees for the reasons presented in the previous Office Action as well as for the reasons provided above in this Office Action." However, the substance of the Declaration evidence remains summarily dismissed, without an adequate discussion as to why

the evidence is deficient. Failure to adequately consider rebuttal arguments and evidence presented by applicants constitutes reversible error. See, e.g., *In re Soni*, 54 F.3d 746, 750, 34 USPQ2d 1684, 1687 (Fed. Cir. 1995).

It is noted that on pages 4 and 5 of the Final Rejection, it is alleged that:

> The extension of the flow plates any length of the cap would have been considered obvious to one of ordinary skill in the art as a matter of design choice depending on the specific flow characteristics desired for the flow plates . . . .
>
> The amount of extension of the flow plates along the cap or the exact dimensions of the plates, would have been considered obvious to one of ordinary skill in the art as a matter of design choice depending on the flow specific characteristics desired for the propeller arrangement. (emphasis added)

The foregoing statement is clearly evidence that inappropriate standard for establishing a *prima facie* case of obviousness has been relied upon. There is no authority for the above-quoted blanket assertion of "design choice," when such design choices are not related to aesthetics, as a basis for establish a *prima facie* case of obviousness. Reliance on this rationale quite clearly constitutes reversible error. Aside from the fact that reliance on improper "design choice" rationale, which quite clearly has nothing to do with aesthetics, applicant has presented evidence which establishes the complexities and counterconsiderations involved in the design of such flow plates, particularly in the context of CRP systems, none of which the prior art recognized or appreciated.

2. Rejection of claim 12

The rejection of claim 12 on the above-noted grounds is also improper and must be reversed for the same reasons noted above in connection with the discussion of the rejection of claim 1.

Moreover, claim 12 requires that the flow plates are constructed and arranged to eliminate cavitation in a separation zone defined between opposing first and second caps of a CRP arrangement. *Parsons* contains no disclosure or teaching concerning addressing cavitation in such a separation zone, which as explained above, presents different hydrodynamic conditions than a propulsion system of the type described by *Parsons* and *Akimoff* which lacks counter rotating propellers.

In addition, *Akimoff* teaches that the alleged "flow plates" exceed the outer diameter of the cap order to provide the alleged increase in propeller efficiency and reduction in activity of the central vortex:

> . . . light ribs 17 are provided on the outside of the appendage 13, which, under certain conditions, for instance, low speed, will yield more effect in the producing of an increased activity of the central vortex. (Emphasis added; page 4, last paragraph)

By contrast, claim 12 requires that the flow plates do not extend beyond the diameter of the cap. Thus, *Akimoff* teaches away from at least this requirement of the presently claimed invention.

It is also alleged on page 5 of the Final Rejection that:

> The amount of extension of the flow plates beyond the maximum diameter of the cap would have been obvious to one of ordinary skill (similar to that described above for the extension of the flow plates along the length of the cap) as a matter of design choice depending on the specific flow characteristics desired for the propeller arrangement in such a combination. (emphasis added)

The reliance upon such "design choice" rationale is clearly untenable and must be reversed. Such rationale is completely inappropriate, especially when applicant has presented evidence (see Evidence Appendix, Declaration Under 37 C.F.R. §1.132 of Tomi Veikonheimo) that demonstrates the complexities involved in designing such flow plates, especially within the context of a CRP-type system, none of which the prior art even addresses. The attempts to backfill the deficiencies contained in the prior art references with conclusory, and factually and legally unsupported "design choice" rationales constitutes reversal error.

3. Rejection of claim 5

Claim 5 depends from claim 1, and additionally requires that the number of the flow plates is independent of the number of blades of the forward propeller, and that the position of the flow plates is independent of the position of the blades. The only statement contained in the grounds for final rejection which can be found in support of an assertion of obviousness of this claim appears on pages 5-6 where it is stated that:

> The diameter, number, position, and method of attaching the flow plates, would all be considered obvious to one of ordinary skill in the art to which the subject matter pertains as a matter of engineering design choice.

As previously noted, controlling authority completely discredits such "design choice" rationale. *In re Gal*, 980 F.2d 717, 25 USPQ2d 1076 (Fed. Cir. 1992); *In re Chu*, 66 F.3d 292, 36 USPQ2d 1089 (Fed. Cir. 1995). Reliance upon such "design choice" rationale clearly constitutes reversal error.

4. Rejection of claim 14

Claim 14 depends from claim 12. Claim 14 further species that the position of the flow plates is independent of the position of the blades of the forward propeller. As noted above the only statement contained in the grounds for rejection which even alleges that the requirements of claim 14 are satisfied is contained in the above-quoted portion on pages 5-6 of the Final Rejection. However, for all the reasons previously explained herein, reliance upon such design choice rationale is entirely untenable, and must be reversed.

5. Rejection of claim 16

Claim 16 depends from claim 12, and further species that the second cap has a maximum outer diameter, and that the flow plates do not extend beyond the maximum outer diameter. Again, the only statement contained in the grounds for rejection even alleging that these requirements are satisfied is contained in the above-quoted portion appearing on pages 5-6 of the Final Rejection. However, reliance on such conclusory assertions of "design choice" is entirely untenable, and must be reversed.

VIII. Claims Appendix

See attached Claims Appendix for a copy of the claims involved in the appeal.

IX. Evidence Appendix

See attached Evidence Appendix for copies of evidence relied upon by Appellant.

X. Related Proceedings Appendix

See attached Related Proceedings Appendix for copies of decisions identified in Section II, supra.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date December 15, 2009

By: _____
Scott W. Cummings
Registration No. 41,567

Customer No. 21839
703 836 6620

VIII. CLAIMS APPENDIX

The Appealed Claims

1. Arrangement in a counter rotating propulsion system comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other, the cap on the forward propeller having a length wherein at least two equally distributed flow plates are arranged on the cap of the forward propeller and that the flow plates are radially projecting from the cap, the flow plates on the whole length of the forward cap and link up to each other and extend beyond an aft facing end of the cap.

2. Arrangement according to claim 1, wherein the forward cap is well-streamlined.

3. Arrangement according to claim 1, wherein the forward cap has a diameter to length ratio not higher than 2.

4. Arrangement according to claim 1, wherein the flow plates are straight and similar to each other.

5. Arrangement according to claim 1, wherein the number of the flow plates is independent of the number of the blades of the forward propeller and the

position of the flow plates is independent of the position of the blades of the forward propeller.

6. Arrangement according to claim 1, wherein the diameter of the flow plates is in the range of 0.4-2 times the maximum hub diameter.

7. Arrangement according to claim 1, wherein the flow plates are integrated to the cap.

8. Arrangement according to claim 1, wherein the flow plates are fixed to the cap by welding or by bolts.

9. Arrangement according to claim 1, wherein the aft propeller is turnable and the aft propeller is used to propel and to steer a vessel.

10. Arrangement according to claim 1, wherein the aft propeller has a streamlined cap.

11. (Canceled)

12. An arrangement comprising:

a thruster rotatable about a vertical axis comprising an aft propeller, a first hub and a first cap; and

a forward propeller, and a second hub and a second cap associated with the forward propeller, the second cap having a diameter, the second cap having a length

comprising a plurality of equally spaced flow plates projecting from the second cap in a radial direction with no inclination and without extending beyond the diameter of the second cap;

wherein the aft propeller and the forward propeller have opposite directions of rotation;

wherein the first cap and the second cap are arranged opposing each other and are spaced apart; thereby defining a separation zone; and

wherein the flow plates are constructed and arranged to eliminate cavitation in the separation zone when the aft propeller is not co-axial with the forward propeller, the flow plates on the whole length of the second cap and link up to each other and extend beyond an aft facing end of the cap.

13. The arrangement of claim 12, wherein the second cap has a diameter to length ratio of less than 2.

14. The arrangement of claim 12, wherein the position of the flow plates is independent of the position of the blades of the forward propeller.

15. The arrangement of claim 1, wherein the cap of the forward propeller has a maximum outer diameter, and the flow plates do not extend beyond the maximum outer diameter.

16. The arrangement of claim 12, wherein the second cap has a maximum outer diameter, and the flow plates do not extend beyond the maximum outer diameter of the second cap.

IX. EVIDENCE APPENDIX

Exhibit A - Declaration Under 37 C.F.R. §1.132 of Tomi Veikonheimo

EXHIBIT A

Patent
Attorney's Docket No. 1034382-000004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	**MAIL STOP AF**
Tomi VEIKONHEIMO et al.	Group Art Unit: 3617
Application No.: 10/539,089	Examiner: Daniel V. Venne
Filed: June 15, 2005	Confirmation No.: 9066
For: ARRANGEMENT IN A PROPULSION SYSTEM	

DECLARATION UNDER 37 C.F.R. §1.132 OF TOMI VEIKONHEIMO

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

1. I, Tomi Veikonheimo declare the following:

2. I, Tomi Veikonheimo, am a citizen of Finland, and have the following mailing address: tomi.veikonheimo@fi.abb.com.

3. I received a Bachelor of Science degree from the Technical School of Turku in 1993 for my studies in the field of Naval architecture.

4. From 11.3.1997 to 30.1.1997 I was employed by Kvaerner Masa-Yards, and worked in the field of hydrodynamics as a hydrodynamicist.

5. From 31.1.1997 to the present I have been employed by ABB in the capacity of hydrodynamicist, and have focused on the development of pod hydrodynamics.

6. I am an inventor of the above identified U.S. patent application. I am familiar with the subject matter of the above identified U.S. patent application, including the content of current claims 1, 11 and 12:

> *1. Arrangement in a counter rotating propulsion system comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, whereby the aft propeller and the forward propeller have opposite directions of rotation and the aft and*

forward propellers are arranged opposing each other, each of the propellers having a hub with a cap, the hub and cap associated with the forward and aft propellers are arranged opposing each other, wherein at least two equally distributed flow blades are arranged on the cap of the forward propeller and that the flow blades are radially projecting from the cap, the flow blades link up to each other and extend beyond an aft facing end of the cap.

11. Arrangement in a counter rotating propulsion system, comprising an aft propeller installed on a thruster rotatable about a vertical axis, and a forward propeller installed on a shaft or on a thruster, the aft propeller and the forward propeller have opposite directions of rotation and the aft and forward propellers are arranged opposing each other, wherein each of the propellers have a hub with a cap, whereby the hub and cap associated with the forward and aft propellers are arranged opposing each other, at least two equally distributed flow blades are arranged on the cap of the forward propeller and the flow blades are radially projecting from the cap, the flow blades link up to each other and extend beyond an aft facing end of the cap.

12. An arrangement comprising:

a thruster rotatable about a vertical axis comprising an aft propeller, a first hub and a first cap; and

a forward propeller, and a second hub and a second cap associated with the forward propeller, the second cap having a diameter, the second cap comprising a plurality of equally spaced flow blades projecting from the second cap in a radial direction with no inclination and without extending beyond the diameter of the second cap;

wherein the aft propeller and the forward propeller have opposite directions of rotation;

wherein the first cap and the second cap are arranged opposing each other and are spaced apart; thereby defining a separation zone; and

wherein the flow blades are constructed and arranged to eliminate cavitation in the separation zone when the aft propeller is not co-axial with the forward propeller, the flow blades link up to each other and extend beyond an aft facing end of the cap.

7. I have reviewed the Final Rejection having a mailing date of May 6, 2008 including the rejection of claims 1-14 under 35 U.S.C. §103 as being obvious over WO

01/54971 to Varis ("Varis") in view of NO 10907 to Parsons; as well as the rejection of claims 1-14 as being obvious over Varis in view of GB 9792 to Parsons (which is characterized in the Final Rejection as essentially the same as NO 10907, thus both NO 10907 and GB 9792 will be collectively referred to as "Parsons").

8. In support of the grounds for rejection, it is stated in the Final Rejection that it would have been obvious to one of ordinary skill in the art that: ". . . an extension of the vanes or blades beyond an aft facing end of the cap would enhance this beneficial result by allowing water to even more effectively close in and press on the cap to impart pressure and additional forward thrust to the shaft."

9. However, extension of the vanes of Parsons beyond the aft facing end of the cap would have at least one detrimental impact on the efficiency of the propulsion system. Namely, extending the vanes of Parsons would increase the surface area of the rotatable body interacting with the water surrounding it, and thus increase the surface friction therewith. This increase in surface friction with the surrounding water caused by the increased surface area of extended vanes would require an additional amount of torque to rotate the propeller, and thus require increased power to turn the propeller relative to a propeller having a cap with vanes having a smaller overall surface area. Therefore, the power required to propel the ship, e.g., in the forward direction, would be relatively greater for the proposed modification of Parsons in which the vanes would be extended beyond the aft facing end of the cap.

10. This principle is also illustrated in the enclosed graph attached hereto as Exhibit A, which compares the propulsion of efficiency of an end cap with no vanes to an end cap having vanes. The graph of Exhibit A plots various propulsion characteristics. Namely, $10K_Q$ (the tenfold value of the torque coefficient K_Q ,a variable without dimensions, defined in a known way based on torque, water density, propeller rate of rotation and propeller diameter), K_T (thrust coefficient, a variable without dimensions, defined in a known way

based on the thrust, water density, propeller rate of rotation and propeller diameter), η_o (the propeller efficiency), and J (the advanced coefficient, $J = V_a/n*D$, wherein V_a is the propeller advance speed, n is the propeller rate of rotation and D is the propeller diameter). As shown therein, the construction which has a higher overall surface area (cap with fins), and thus a relatively higher surface area with higher resulting surface friction with the surrounding water, exhibits a lower overall propulsion efficiency than a construction having a lower overall surface area (cap without fins), and thus lower overall surface friction with the surrounding water. Thus, the analysis and comparison summarized by the graph of Exhibit A demonstrates the same principle as that discussed above in connection with the proposed modification or extension of the vanes of Parsons; a cap structure having a relatively larger surface area, and resulting relatively larger surface friction with the water surrounding it, can have a negative impact on the efficiency of the associated propulsion system.

11. I further declare that all statements made herein of my own knowledge are true and that all statements on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statements may jeopardize the validity of the application or any patent issuing thereon.

Date:1.12.2008 By: _____
Tomi Veikonheimo

EXHIBIT A

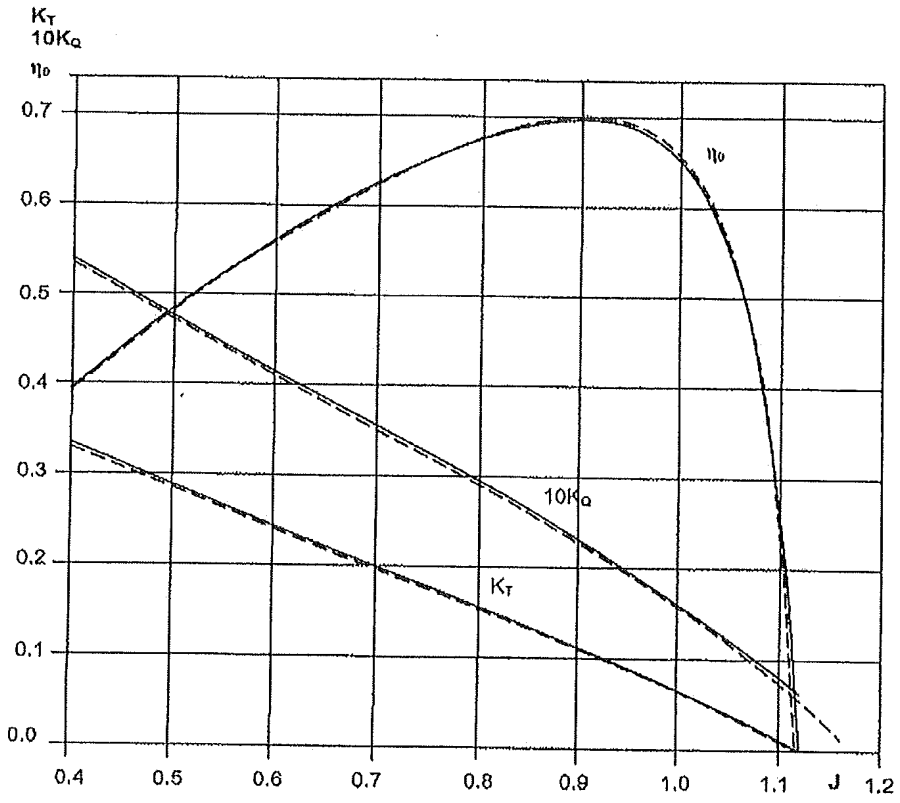

Fig. 2.9. Propeller model N8001 hydrodynamic charateristics

– – – – standard cap

——— cap with fins

X. RELATED PROCEEDINGS APPENDIX

NONE